



UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office

Address COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
-----------------	-------------	----------------------	---------------------

EXAMINER

ART UNIT

PAPER NUMBER

DATE MAILED:

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/627,649

Applicant(s)

SANDHU ET AL

Examiner

Tuan Quach

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claims ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892)
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3
- 18) ☐ Interview Summary (PTO-413) Paper No(s) ____
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other

DETAILED ACTION

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 3-9, 11-14, and 16-18 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Jeng

Jeng '303 shows conductive lines 62/58/60 on silicon oxide 66 and 64, low k dielectric material 78 located between adjacent lines 58, the upper surface of layer 78 being higher than the upper surface of line 58, and the lower surface of layer 78 being lower than the lower surface of line 58, as shown in Figs. 14-16, column 5 lines 33 to 56, column 6 lines 35-36. The provision of the upper layer of refractory metal nitride and of the optional oxide 56 is also taught, column 3 line 49-67. The use of this oxide although not shown in other embodiments would have been met given the teachings at column 3 lines 21-25 or alternatively, it would have been obvious to one skilled in the art to have included such liner as taught therein.

Claims 2, 10, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jeng ('303) as applied to claims 1, 3-9, 11-14, and 16-18 above, and further in view of Jeng (5,486,493).

Jeng '303 is applied above and does not explicitly recite PTFE as the dielectric material.

Jeng '493 teaches the use of low dielectric constant material 20 between conductive lines 14a-14d comprising polytetrafluoroethylene. See column 1 line 48 to column 2 line 15, column 3 lines 29-65. The dielectric constant between 1 and 3.9 is also taught. See column 6 lines 4-19.

It would have been obvious to one skilled in the art at the time the invention was made to have employed in Jeng '303 the particular PTFE dielectric material or material having low dielectric constant because such use is conventional and advantageous to

Claims 4, 12, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jeng '303 as applied to claims 1, 3-9, 11-14, and 16-18 above, and further in view of Homma et al.

Jeng '303 as applied above does not recite all the various conductive materials such polysilicon, aluminum, copper, tungsten, and multiple layers of TiN/Al/TiN, TiN/Al/Ti, W/TiN/Ti, or any combinations thereof.

It would have been obvious and would have been within the purview of one skilled in the art to have employed the materials enumerated since such correspond to typical aluminum material or other conventional conductive materials as acknowledged in the specification pages 17-19, and since such substitution of well known conductive materials is well within the purview of one skilled in the art as evidenced by Homma et al., column 5 lines 21-25. Copper is a well known conductive material and its use in the list enumerated would have been obvious.

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(h).

Claims 1-5 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-9 of U.S. Patent No. 6,107,686. Although the conflicting claims are not identical, they are not patentably distinct from each other because it would have been obvious and apparent that the claim language in the instant claims, e.g., claim 1 line 2 reciting "a first dielectric layer" would encompass the single first dielectric layer situation as well.

Claims 6-18 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-9 of U.S. Patent No. 6,107,686 in view of Jeng '303.

These claims, in addition to the limitations in claims 1-5, further recite the upper surface having a layer of refractory metal nitride, e.g., claim 6 lines 12-13, or of titanium nitride in claim 14 lines 12-15 and the second dielectric thereon being silicon dioxide.

Jeng '303 shows conductive lines 62/58/60 on silicon oxide 66 and 64, low k dielectric material 78 located between adjacent lines 58, the upper surface of layer 78 being higher than the upper surface of line 58, and the lower surface of layer 78 being lower than the lower surface of line 58, as shown in Figs. 14-16, column 5 lines 33 to 56, column 6 lines 35-36. The provision of the upper layer of refractory metal nitride and of the optional oxide 56 is also taught, column 3 line 49-67. The use of this oxide although not shown in other embodiments would have been met given the teachings at column 3 lines 21-25 or alternatively, it would have been obvious to one skilled in the art to have included such liner as taught therein.

Accordingly, it would have been obvious to one skilled in the art to have employed in the claimed invention the further provision of refractory metal nitride including the oxide thereon since such is conventional and advantageous as taught by Jeng '303 wherein the upper metal nitride would serve as a capping layer and the silicon dioxide layer would serve as conformal liner thereon.

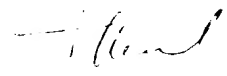
The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Hyakutake, Lee et al., Cox and Havemann et al. teach multilevel interconnections and low dielectric constant materials of interest.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Quach whose telephone number is 703-308-1096. The examiner can normally be reached on M-F from 9 to 5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri, can be reached on (703) 306-2794. The fax phone number for the organization where this application or proceeding is assigned is 703-308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.


Brian Quach